Creating Community Commitment

for NASA ESE Interoperability, Metrics, and Technology Development:

The Case of the ESIP Federation

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As the Strategic Evolution of E.D.S. project plans ahead to new opportunities and requirements in the delivery of massive amounts of earth data to what is envisioned as a rapidly growing population of data users, it is more and more clear that the risks surrounding this nationally important effort become less manageable the more that control is exerted from the ultimate supply-side, that is, from NASA. It doesn't take the National Academy of Science to tell anyone in this room how advances in technology can overturn even the best-considered centralized plan.

What the NAS did tell us, some years back, is that we need to find ways to embrace *change*. And events in the last five years have underscored this need. In fact, change has become such a risk for the software development process, and the accelerating *pace* of change—from new hardware capabilities to new

customer interests—has become so acute, that developers have rejected the old design it→prototype it→build it pathway for an alternative development pathway that keeps asking the users if they still want what they said they did yesterday. "Extreme programming" is a good example of this new mode of software development embracing the need for advanced risk avoidance. And the strategic evolution of EDS is very much akin to its software cousins in the gaming and enterprise solution sides of software development. So we can bet that we are looking ahead to an era of continuing and accelerating change.

What I am proposing today is that risk avoidance is yet another reason for NASA ESE to invest in community building among the population of earth data users and providers. For the desired outcome...a lean and nimble system that can deliver valuable earth data resources while it responds to changing demands from earth scientists and new technologies... is perhaps only possible when NASA takes the lead in fostering community-led interoperability standards, data use metrics, and technology development.

Please note that I am suggesting that NASA takes a lead in *fostering* data user communities to develop, not a lead within community organizations. These two roles are not the same. As a key government agency NASA's eventual role in this community will remain a pervasive and complex one, but not necessarily nor perhaps desirably a leadership role. For data user community organizations to fulfill their desired roles, they will need to achieve a partnership with NASA. This means that NASA needs to build partners, not clients (this is not unlike parents who need to raise adults, not children). This also suggests that community-building activities cannot be managed in precisely the same way as grants and cooperative agreements are managed.

I seem to be slipping between the terms "community" and "community organization." Let me clarify this point. Since the data user community that is being imagined here is national and even international in scale and embraces a diversity of user types and needs, the locus for the community will necessarily be

one or more community organizations. Like the commons to a village, or the civic plaza in a metropolis, the organization provides the space, both literally and metaphorically for the community to exist and grow with the population.

Communities need community centers and agencies: places and activities that promote the community's vision while filling member needs. The main reason individuals join communities is to gain something, not simply to give. But by the strange mathematics of some communities the more and more members give the more they get back. It is precisely this internal economy of obligations and rewards that makes a community an engine for positive action. And for SEEDS, and for NASA ESE, this engine powers metrics, interoperability and technology development activities faster and smarter than any contract.

Investing in Communities

NASA's investments in community should be designed to build agencies within earth data user community organizations that can provide services to their communities in partnership with NASA. Not all user services or product development can be effectively or efficiently managed directly by NASA. Services such as interoperability standards development more rightly belong to the community that must live with them. And there is a range of activities (such as metrics feedback on downstream data use) that simply will not develop within the population of data users without investments that transform this group into *communities of users*. So not only do certain tasks get done better, other tasks are enabled that would not get done at all without community organizations.

A classic counter example: big government at work

Here, I think the lessons of the history of HDTV are illustrative. In the late 1960s the Japanese government began a long-term central-government-led project to create the standard for HDTV. Based on the technologies of the time, their standard used an analog system. By combining the talents of Japanese manufacturers and the government broadcasting system (NHK), a working HDTV

system was ready for use by 1990. At this point NHK presented this system as a *de facto* standard for the world—it was the only actually operational system in existence. However, with the Europeans worried about the flood of American movies on Japanese equipment, the international decision on a standard was delayed for some months. During these months, an American electronics company, General Instrument Corp. produced a radical and inexpensive design for an all-digital HDTV system, and within 6 months after that there were several competing digital HDTV systems in the picture. And so, suddenly, after 22 years and several trillion yen invested, NHK found it was selling a technology that nobody wanted. One would think a lesson was learned here...

Well, in 1993 when the Minister of Communications admitted that Japan would probably need to abandon its analog system, he was promptly admonished to apologize for his mistake, and to rephrase his announcement, which he did the next day, and today Japan has the only national analog HDTV system in the world--serving about 5% of its original expected customer base. Even so, at some point (and now we are waiting after nearly another decade already and still more tens of billions of yen) Japan will be forced to abandon their government-sponsored technology-by-fiat-standard in favor of standards that were developed on the basis of the adoption of technologies that have broad application (digital broadcasting offers a wide range of content options); relatively open development pathways (lots of add on opportunities, and potential for clustering by competitors on new developments); and the promise of broader customer acceptance through its pricing and user-side customizability.

I am not in a position to tell what analogies there might be between analog HDTV and EOSdis, but I do want to propose that the challenge for SEEDS, is very much the same as it was and is for digital HDTV: creating a marketplace where the content, producers, and the users can grow together. And since we are another decade into the digital maelstrom, the emerging risk is to do this before

the technology standards that are created--even in some optimal manner--become anachronisms.

The way forward is neither clear or secure

While NASA ESE and SEEDS readily admit that the one-contract-fits-all concept is a thing of the past, the way forward is less than clear. The other fear here is that, even by abandoning the centralized, ten-year plan, data and information system model in favor for the activated community of users and best practice data provision model may not be enough to create useful standards and data systems for the next 20 years, or 10 years... or even 5 years. We are looking at the need to build something we can reinvent in, at most, 4 years. And so we need to build in the reinvention mechanisms so it does not take 3 years to do this. This is where interoperability, metrics, and technology development are all features of an *interdependent* practice that partners NASA ESE and deeply developed user community organizations. This type of solution, which mirrors recent practices in the commercial IT world, will necessarily become what SEEDS will need to offer as NASA's answer to its present challenge.

A community-led technology practice avoids the bigger black holes...but how?

The idea of a "community" of data users crops up regularly in visions of the future for NASA ESE planning. I would like to spend a just little time --with my social anthropologist hat on here-- to suggest how this idea can acquire a better purchase on the goals that SEEDS has set for its project. But to begin with, I would like to offer that the earth data user population today only partially—and then mainly because of NASA's community building efforts—resembles a community. As we will see, populations and communities are not the same thing at all.

"Community" is a term with a broad general meaning and more specific uses in social anthropology and sociology. The semantics of "community"

generally flows into simultaneous notions of groups and places--we each grow up almost by default in or with something someone can call a community... whether this is a cabin in the woods (a rural community) or a religious cult (e.g., the Jonestown community). Every level of government, particularly the nation-state (the main source of national community identity formation) has been called a community of sorts. Cities, neighborhoods, ethnic groups, gender choices, and even generations (e.g. Pepsi, "X", etc.)... no matter what the object, the term "community" seems to fit tighter than a teenager's t-shirt. However, the population of current and potential earth science data users is not by itself a well-formed group nor does it occupy a specific place. This population, like many populations based on consumption habits (from heroin junkies to Saturn owners) may have someone calling them a community, but simple naming is not sufficient to make them a community. Calling the earth data user population a community does not make it so.

At the prior workshop, SEEDS was asked to "respond to" the data user community, "engage" the data user community, and even "build" the data user community. All of these tasks assume that SEEDS knows what a community is. As I mentioned earlier, we are surrounded by communities that will not go away, but neither do they announce their intentions and potentials. So then the question simply becomes that of determining what sort of community should SEEDs attempt to build, and engage, and respond to?

And this brings me back to the ESIP Federation, in its current state, and in its potential roles in the future of the Earth Data System. The ESIP Federation is in the final year of its initial 5-year "experimental" phase. While the original expectations of this experiment may have been tempered by early budget cuts that took away much of the support for actually federating, the effect of requiring that ESIP cooperative-agreement holders federate and then forcing them to do so mainly from their own resources may have actually accelerated the central

outcome of this experiment--the forging of a model data provider/user community organization out of a sampling from the data user population.

ESIP Community

The ESIP Federation provides a model for a desired type of community organization, and a vehicle with which SEEDS can begin to build, engage, and respond today, and not in another 5 years. One of the useful aspects of the ESIP Federation is that it is now 5 years ahead of other earth data user community organizations that might yet be formed--and certainly more community organizations are welcome in the future. And of course there are other organizations where earth data users find each other's company: academic and trade groups that are well known in this room. But the ESIP Federation is particularly devoted to the goals of expanded earth data and information use. The Federation, while hoping to grow in a manner that acquires a broad spectrum of interests within the data user population, doesn't need to, or want to (although some members might want it to) be the only Earth data user community organization in town--or at least on the planet.

Commitment, Sharing, and Communication

What can we say about the ESIP Federation as a community that brings this term into practical use in planning for interoperability, metrics, and technology development? What aspects of its community-ness are applicable here? Let me focus on 3: **commitment, sharing, and communication**.

The ESIP Federation, while it is a federation of organizations, is also very much a confederation of individuals. The Federation has succeeded already in creating agencies that build, engage and respond to earth data users. The process of building these agencies within the governance of the Federation is, and will probably always be a work in progress. Three years of constitutional conversations and vexations hammered out the agreements that have established on paper the structure of collaboration and decision-making agencies, while also establishing socially something else just as valuable: the currency for

commitment to shared goals and practices. Through these agencies--in its government and organizational structures—the Federation promotes interoperability and standards development (e.g. DODS), metrics development and collection (both reporting same and having something to report), and technology development (e.g. clustering as a rapid response to immediate problems and opportunities).

Again, you might be thinking, it is the simply the agencies of the Federation, its constitution and bylaws, and the tasking of its committees that have created the desired effect. And here I would need to say definitely yes, and, at the same time, absolutely not at all. What preceded and subtends these agencies is the community-based logic of commitment, sharing, and communication.

Commitment here is a commitment of time and person far beyond the funding provided for the Federation to federate, and a commitment to see this organization thrive, despite the plans of the powerful forces that would like the Federation to go away. Sharing is also a commitment, an attitude of mutual trust and a perspective on the need to work together to create a better launching pad for everyone's project. And communication is the thousands of emails and the hundreds of hours in meetings--and the tens of hours in saloons across the nation--where a group of almost savage competitors have found their common ground.

Communication linked to commitment and based on the notion of collective interest is the hallmark for the types of communities and community organizations that SEEDS and NASA needs to build, engage, and respond to. Otherwise what SEEDS will find is that it is surrounded not by a data user community, but by a disorganized data user population where individuals working alone or in a scattering of organizations do not share perspectives, do not share their meta-data, or even talk the same data definitions, would not think about

sharing their technologies, and wouldn't cough up a metric unless it paid better than whatever else they were working on this month.

The strengthening of earth data user community organizations opens up a range of potential actions that members can take beyond what is nominally expected of them. A spectrum of obligations, expectations, benefits, and rewards are only possible within a community. A community, for example, is where heroes are possible. You will not find heroes in populations: only exceptions to the bell curve. If the notion of "earth data use heroism" seems a bit outlandish, consider that heroics mark the far end of a range of extraordinary actions... all of which become possible only through communities. What I am suggesting here is that there is a generalized return on investment in the growth of communities, which is the added effort and commitment that members bring to their interactions. However, this ROI assumes and requires an original and continuing investment, even though much of this investment becomes internalized within the community.

For example, the ESIP Federation is faced with the task of reproducing itself, of strengthening the affective ties between its members, and folding new ESIPs into this community organization in a way that transfers this bundle of informal obligations to the new members. The Federation is working to accomplish these tasks.

Domestication and the public sphere

Stepping back up to the level of the theory of communities, I want to add some additional ideas into what SEEDS and NASA ESE get as a return on investment in community building. One way to think of a community is to consider the process of what might be called "domestication." I'm not talking about your family pet here, but of the overall process of creating a space that is safe enough for really dangerously inventive ideas to emerge. One of the apparent paradoxes of social theory is the observation that safety and risk are paired in a dynamic equilibrium. This means that the safer people feel, the more risk they will

voluntarily assume. The growth of extreme sports during the decade of strong economic boom times in the 1990s is a good example, and so, for those who might remember, is the '60s.

Domestication can describe the transformation that must happen for a stranger to become a friend, or for an inhospitable place (or data type) to become familiar and useful. Domestication of people and spaces is a hallmark of community building in neighborhoods and towns throughout time. And I would not hesitate to argue that it is in every data user/provider's interest to have available a domesticated space and a host of data user friends with which to interact in this space. The interesting part about domestication is that this leads to an opening of more risky discourses, the start of a much more interesting mode of conversation that one can only pursue among friends. The domestication of the space of earth data use allows for a critical discussion of the current state and the potential future for the entire endeavor. One of the opportunities and challenges for the ESIP Federation is to create a sense of shared friendship and trust among its earth data provider/users members and by so doing, enable more interesting conversations: for example, the types of conversations that lead to technical innovations.

From friends to senators

A final word on community before I conclude. And this has to do with "speaking for the earth data user population." One of the potential and desirable outcomes of fostering community organizations and collaborations among the earth data provider user population is the opportunity to build a *public* organization that can claim, with some reservations, to speak for this population. If SEEDS and NASA ESE is really serious about engaging this population, then the existence of an organization or an organization of organizations that can honestly claim to represent this population is of tremendous value. NASA can then approach this organization with its plans and needs and find out about the population's plans and needs. As of today no such organization exists. Right now, the ESIP

Federation speaks for its members, not for the earth data population. In the future, I would like to see the ESIP Federation build itself to the point where it can make the claim to represent a goodly portion of this population, at least in terms of the voices that are enabled within the Federation.

In order for an organization to claim to speak for a population, this organization must assume the role of a public organization, or just "a public". What is a public? A public, which is a certain type of community, opens its membership without restriction to all population members either directly or though some sort of representation, and offers them a voice. A public does not exclude subpopulation interests. A public assumes an interest in the good and in the future of an entire population, and talks and then acts on the basis of this more general good. The US Senate, for example, is a public, being representative of the US population, and speaking for and considering in its actions the good of this population. The idea of the public is important for SEEDS as this opens up the potential for a long-desired (or, in any case, long discussed) goal of data user population feedback to future missions and instruments. An earth data user *public* can speak for its population directly to congress and the administration. The absence of this voice is one of the reasons that the needs of this population may not be prominent in the deliberations of congress.

Conclusion

As you have not doubt gathered so far, I am not trying to offer detailed information about which metrics or standards or technologies the ESIP Federation would like to see SEEDS consider. Instead, I am proposing a procedural logic for these three tasks. If we can build the community organization, task it to make these happen, and support the process of articulating the outcomes, then NASA ESE will have a new partner that can help it reach its goals.

The task of building a community to service the needs of the population of individuals that are attempting to access a high-technology, big-science, large-scale operation such as the EDS is profoundly interesting in that it cross-cuts a lot

of the historical institutional logics of vertical systems and controls. But the potential gains are rather impressive, particularly the gain of time and timeliness. Here the internet is a good example of how a concerned technical community that valued commitment and sharing was able to foster real-time changes in standards and technology advances.

NOW... the ESIP Federation has a long ways to go to be able to build itself into a larger community where newcomers acquire the same level of commitment that the ESIP pioneers have. There are multiple challenges ahead for this community organization. But I believe that the Federation is ready and certainly willing to work with everyone in this room to help enable the strategic evolution of EDS.

Please send comments to my email below, thanks!

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